# CHAPTER 11

# BASIC PHOTOGRAPHY

How much does a Navy journalist need to know about photography? Some JOs are expert photographers, while others resort to asking imaging facility personnel for photographic coverage of an event.

The fact remains that you will be tested on your knowledge of photography. At some point in your career, your supervisor will expect you to know the fundamentals of photography, to take news photographs with good composition, to use standard Navy darkroom equipment to process exposed film and to produce contact and projection prints.

If you can do these things already, you have a very important trait needed in the JO rating — **versatility** However, if photography is not your strong suit, pay particular attention to the information in this chapter and the one that follows ("Basic Photojournalism," Chapter 12). Also, there is nothing like hands-on experience. Ask a senior JO for some on-the-job training or contact the nearest Navy imaging facility for instruction.

**NOTE:** This chapter is intended to aquaint you with the basic concepts of photography. For more detailed information, consult the *Photography* (Basic) and *Photography* (Advanced) TRAMANS.

## THE PHOTOGRAPHIC PROCESS

*LEARNING OBJECTIVE: Identify the basic process of photography.*

The basic equipment required for the photographic process, as shown in figure 11-1, includes the following components:

- A subject
- Alight source
- A camera
- Photographic film
- Chemicals for processing film
- A printing device
- Photographic paper
- Chemicals for processing paper

### SUBJECT

The subject can be anything. If it can be seen, it can be photographed. Just as there must be light to form an image, there must be a subject from which to form the image.

### FILM

Film, as defined in this chapter, is a light-sensitive emulsion of silver halides suspended in gelatin and coated on a transparent and chemically neutral base, usually cellulose or polymer plastic. The choice of film type is determined by the size and the sensitivity required by both the camera and the nature of the light to be used. During the exposure, silver halide crystals in the emulsion undergo anionic change forming a latent image that can then be reduced to a visible and usable image through a complex chemical process.

### CAMERA

The camera is essentially a lighttight box with an optical system at one end and an image support at the other. Additions to the basic camera have been made to improve focusing the image, viewing, controlling the amount and duration of light entering the box, film changing or rolling and range and exposure calculators. While these improvements are valuable, they are not absolutely essential to the photographic process. A picture can be made with a coffee can if it has a pinhole atone end and a support for film at the other.

### FILM PROCESSING

The processing of film to convert the latent image into a stable, visible image for use in printing requires you to carry out the following four basic steps:

- Developing or converting exposed silver halides to metallic silver — the black or dark portions of the visible image
- Fixing or changing the silver halides unaffected by the developing to soluble salts

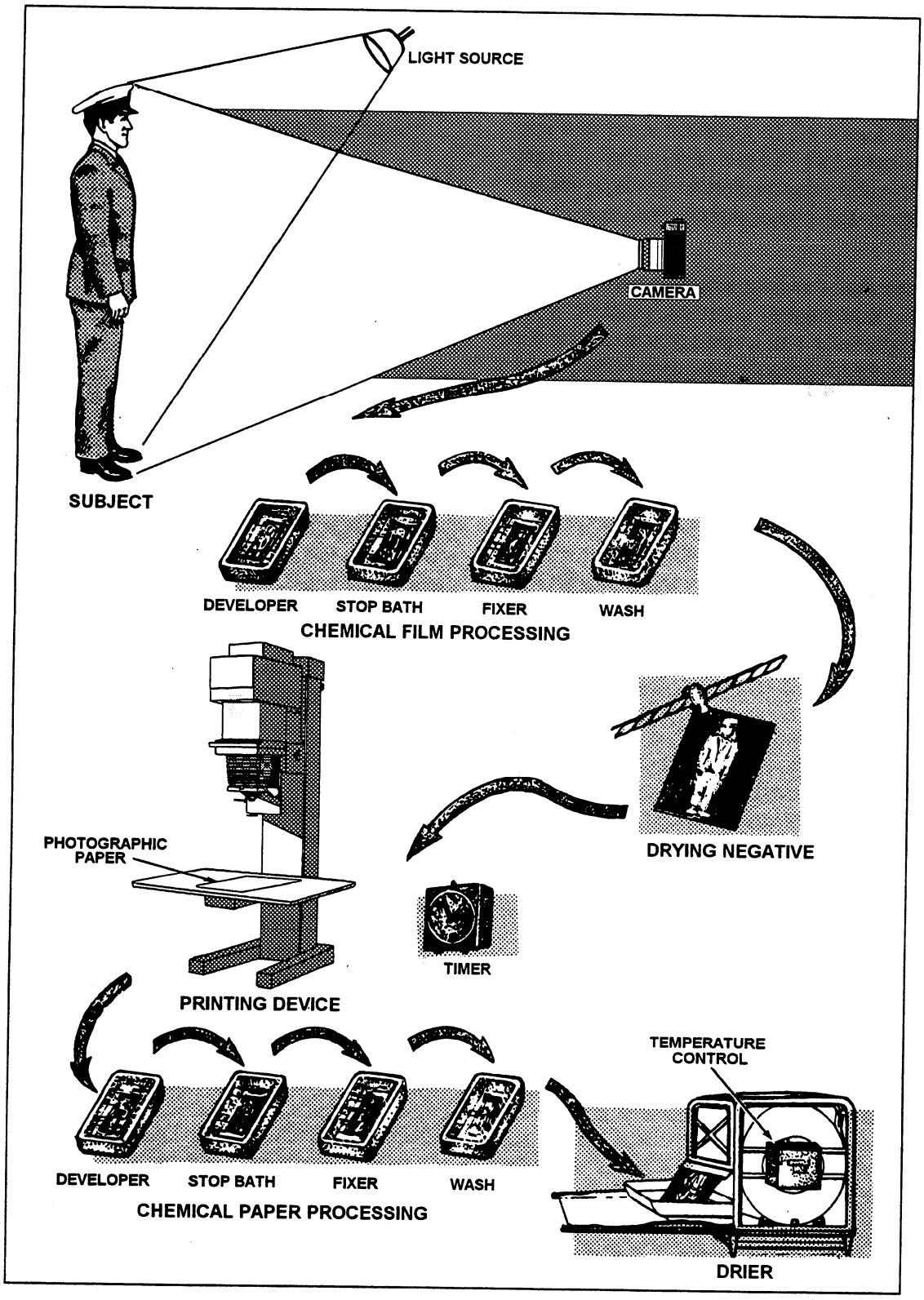
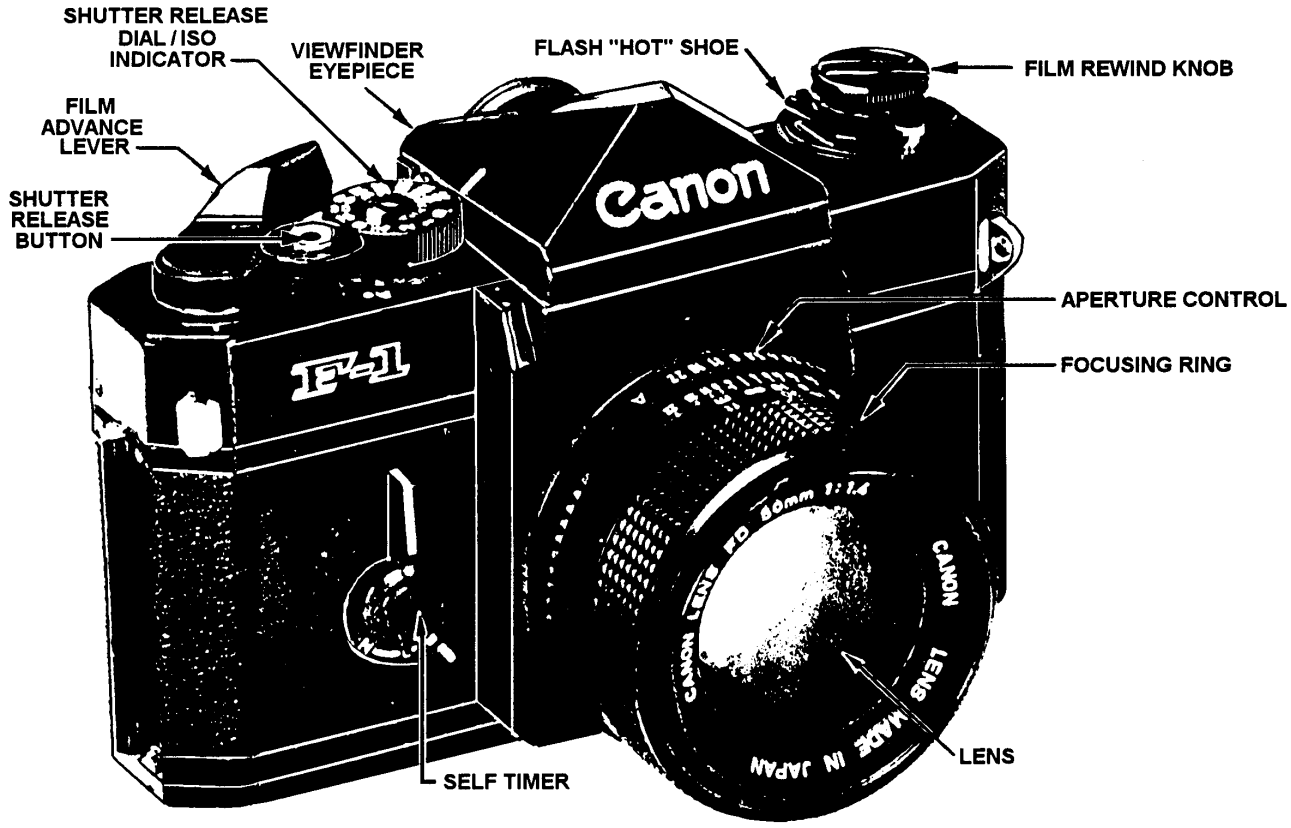



Figure 11-1.—The photographic process.




AN R. B. Burrows

**Figure 11-2.—The 35mm single-lens reflex (SLR) camera.**

- Washing to remove the soluble salts and residual chemicals

- Drying the film for handling

Once these steps have been completed, you have a negative ready for printing.

## PRINTING DEVICES

Printing the negative, or making a positive, is done by contact or projection. The contact printer is usually a box with an internal light source and a piece of glass that allows light to pass through it and the negative to form a latent image on photographic paper held in contact with the negative.

The projection printer allows the image on the negative to be projected and the size of the print varied. This type of printer consists of a light source, a negative holder and a lens and focusing device mounted on a frame which can be raised and lowered, depending on the size of the projected image desired. The photographic paper is held in an easel.

## PHOTOGRAPHIC PAPER

Photographic paper has essentially the same emulsion as film. The chemical process is the same as that for film but produces a positive image. Choice of paper types is dependent upon the type of printing, surface, size and finish desired.

## THE 35MM SINGLE-LENS REFLEX CAMERA

*LEARNING OBJECTIVE: Identify the basic parts of a 35mm single-lens reflex camera.*

As a Navy journalist, the 35mm single-lens reflex (SLR) camera (fig. 11-2) will serve as your tool to tell a story with photographs. For this reason it is important for you to become as familiar as possible with your camera, know what the camera can do, then know what you want it to do.

The SLR camera gets its name from the use of a mirror to reflect an image formed by a single viewing and taking lens onto a viewing screen for focusing. A

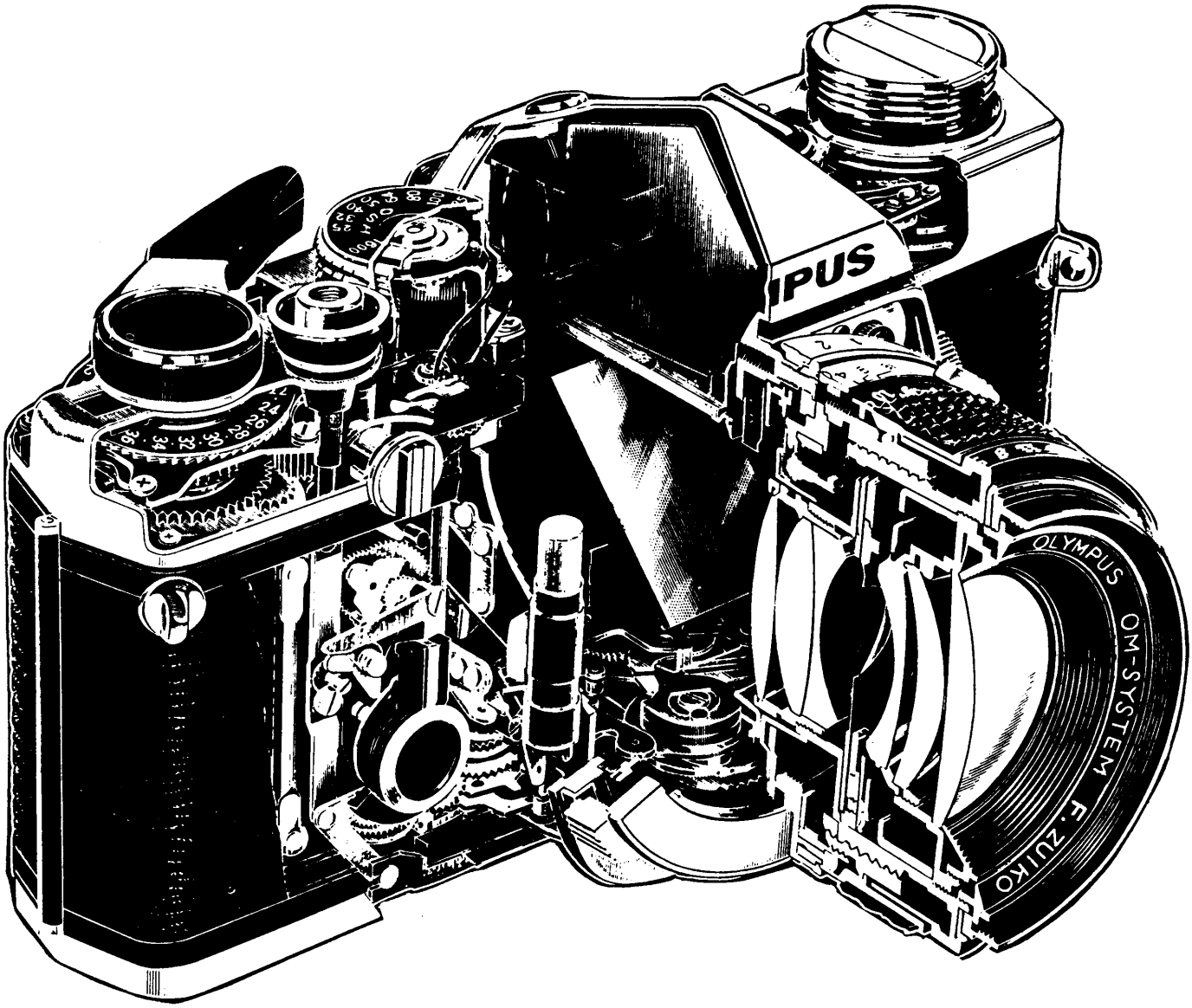



**Figure 11-3.—A cutaway view of a 35mm SLR camera.**

cutaway view of a 35mm SLR camera is shown in figure 11-3, and the basic principle of the SLR camera is shown in figure 11-4.

The mirror, set at a 45-degree angle to the optical axis, reflects the image through a pentaprism that accomplishes vertical and lateral correction of the image. At the moment of exposure, viewing is disrupted for a split second, as the spring-operated mirror swings out of the lens-to-film optical path. The mirror then automatically returns to its original position for the next exposure.

Important advantages of the SLR design are the ease of viewing and focusing and the photographer's ability to judge the effect of the depth of field at a selected aperture. Depth of field will be covered later in this chapter.

Probably the most important advantage of the SLR camera is the ease with which it can be used. Its small size and compactness enables photographers to carry them strapped around their neck or over their shoulder. Little preparation is necessary for them to be put into operation. Another advantage is the rapid film-changing devices incorporated into the cameras. They can be used to great advantage when many photographs must be made in a short period of time. Design of the average SLR camera is such that minimum time is required for making the settings and winding the film.

Because most SLR cameras make as many as 36 exposures on a single roll of 35mm film, the photographer can carry enough film in one pocket to make many exposures. This type of camera is helpful for news and action photography where several pictures must be made in a short time. It is also indispensable for color slide work.

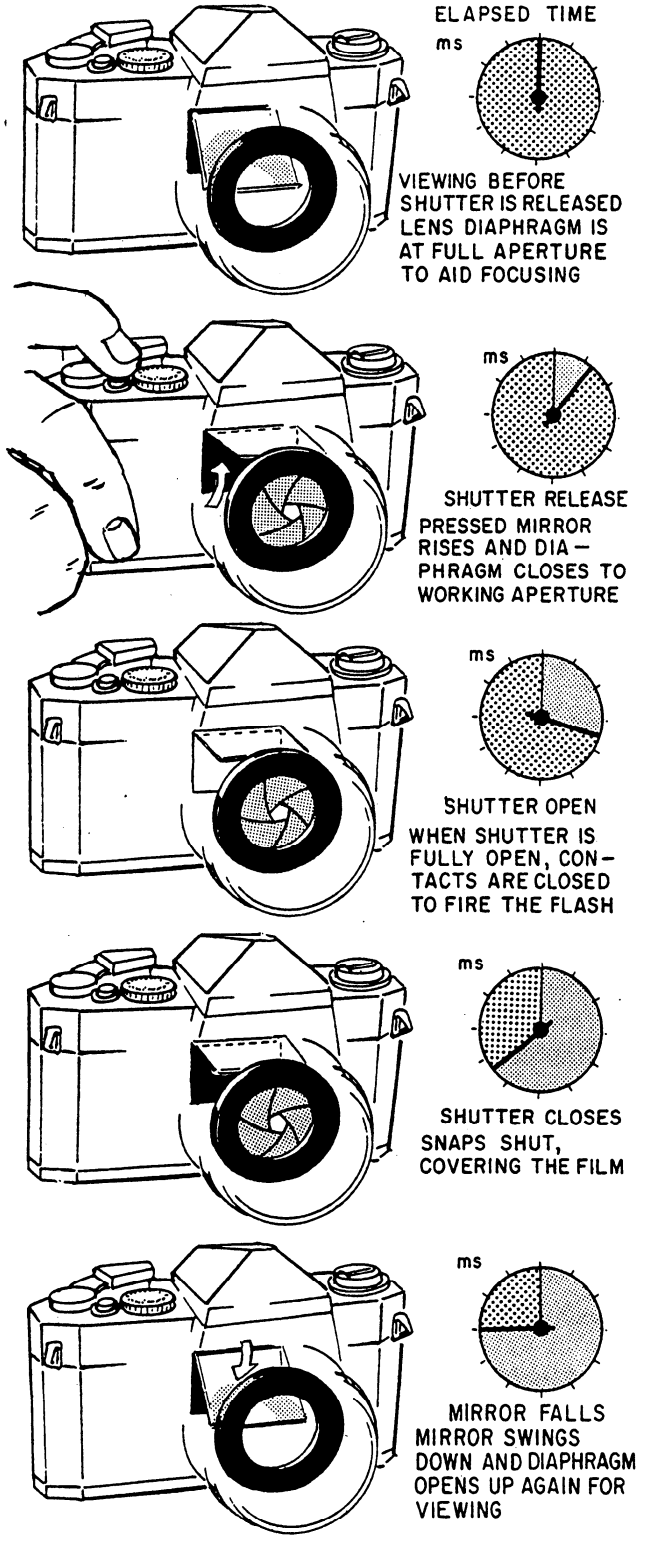



**Figure 11-4.—The basic principle of a 35mm SLR camera.**

Modern SLR cameras accept a vast assortment of lenses, ranging from fisheye to extreme long-focus types. With their interchangeability of lenses, film backs and other accessories (such as electronic flash attachments), SLRs can more aptly be called camera "systems."

Lenses are usually attached to the camera by a bayonet flange. Focusing is done by turning the lens focusing ring. A screw thread, which runs around the inside of the lens barrel, moves the lens closer or farther away from the film, as the focusing ring is turned.

Most SLR camera lenses have an iris diaphragm. This diaphragm is held at full aperture for focusing and viewing and is stopped down automatically to the preset working aperture at the instant of exposure. This means that while the image on the viewing screen is bright and easy to see, only the connect amount of light reaches the film for exposure.

Your SLR camera will have a built-in exposure meter that usually reads "through the lens" (TTL). The meter may measure the light falling on the minor, the focusing screen, or in some models, even on the film at the instant of exposure. On an automatic camera, the meter even adjusts the aperture or shutter speed to give the correct exposure. On manual cameras the meter produces a display in the viewfinder to indicate the correct exposure. The user then sets the camera controls to get the correct exposure.

Almost all SLRs have final-plane shutters. They simplify the construction of the camera and make the use of interchangeable lenses easier. The shutter, aperture and mirror all work together in a precise sequence, repeated each time a picture is taken.

The relatively small size, ease and speed of operation, reliability and the high quality of photographs of the SLR cameras have combined to make it a favorite of professional photographers and photojournalists.

## CONTROLS AND INDICATORS

In the Navy, most photojournalists are issued a camera kit that consists of a Canon F-1 35mm SLR camera, a 50mm lens, a 35mm lens, a 135mm lens and a flash unit. This camera is shown in figure 11-2.

Some of the main controls and indicators of the 35mm SLR camera are covered in the following text.

### Film Advance Lever

The film advance lever advances the film one frame at a time, cocks the shutter, prepares the aperture and mirror for exposure and advances the frame counter one number.

**Shutter Release Button**

The shutter release button opens the shutter and initiates the exposure.

**Shutter Speed Dial**

The shutter speed dial indicates optional shutter speeds and sets the length of time the shutter remains open during an exposure. Shutter speeds are indicated in fractions of a second; for example, 60 = 1/60 of a second (also expressed as 1/60"). The higher the number on the dial, the faster the shutter speed and the shorter the exposure.

**ISO Indicator**

The ISO (International Standards Organization) indicator allows you to compensate for the particular "speed" of your film. For example, if you are shooting black-and-white film with an ISO of 400, you will set your ISO indicator to 400. The higher the ISO, the more light sensitive the film.

**Aperture Control**

The aperture control is a ring around the lens with a scale listing aperture numbers (2.8, 3.5, 4, 5.6, etc.). These numbers are also known as "f/stops." The ring sets the f/stop on the lens to control the amount of light entering the lens.

**Film Rewind Knob**

The film rewind knob is used to rewind the film into the cassette (film canister), to tighten slack in loaded film and to open the back of the camera. You turn the knob in the direction of the arrow to rewind the film, and lift it to open the back of the camera.

**LENSES AND APERTURES**

As noted previously, most 35mm SLRs have interchangeable lenses. The "final length" of a lens is the distance from the optical center of the lens to the final plane (film plane) when the camera is focused upon an object at itifinity. A 50mm final-length lens is considered the "normal" lens because when you look through the viewfinder, objects appear at their approximate normal size. A smaller than normal focal length (such as 28mm) means a wider angle of view. A longer than normal final length (such as 135mm) is a telephoto lens. Focal length affects film image size.

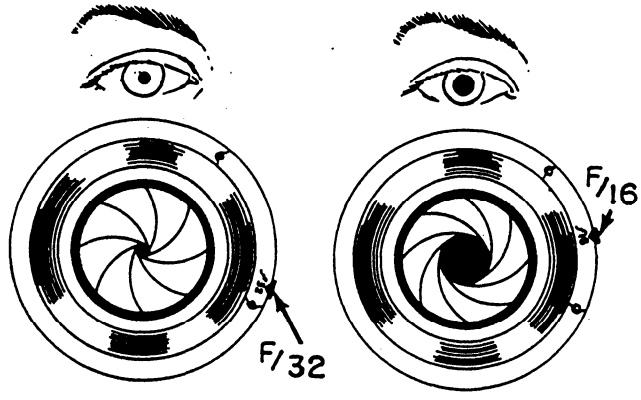



**Figure 11-5.—Comparison of the iris diaphragm of a camera lens to the iris of the human eye.**

The f/stop (aperture) ring controls the amount of light passing through the iris diaphragm of the lens and striking the film. The higher the f/stop number, the smaller the amount of light allowed to enter the camera lens. This principle works in the same manner as the iris of the human eye (fig. 11-5).

**OPERATING THE 35MM SLR CAMERA**

*LEARNING OBJECTIVE: Determine the proper operating procedures for the 35mm SLR camera.*

The components of a 35mm SLR camera are of little consequence if you do not know how to use them together. In this section, you will learn how to perform the following functions:

- Loading
- Holding the camera
- Focusing the camera
- Setting the film speed
- Activating the light meter
- Setting the shutter speed
- Setting the aperture control
- Shooting the picture
- Unloading the film

**LOADING**

You should load the camera in subdued light (not direct sunlight) and use the following method:

1. Place the film in the chamber, grasp the beginning of the film (called the leader) and feed it onto the sprockets of the take-up spool.

2.- Move the film advance lever forward, depress the shutter release button, and again advance the film one frame.

3. Close the back of the camera carefully and depress the shutter release button.

4. Advance the film another frame and **watch the rewind knob to make sure it moves.**

If the rewind knob does not move, either you loaded the film incorrectly or there is still some slack in the film cassette. The latter situation can be checked by your gently rotating the rewinding knob clockwise without depressing the rewind button on the bottom of the camera (as is usually done when rewinding film).

## HOLDING THE CAMERA

Although you may hold the camera in any manner that best suits you, give serious consideration to the method described in the following text. It will give you a steady platform for the camera that will help you reduce camera movement.

Grasp the camera on the right side with your right hand (fig. 11-6). Use the index finger of your right hand to depress the shutter release button and the thumb of your right hand to advance the film. Adjust the shutter speed control with the index finger and thumb of the right hand.

Use the index finger and thumb of your left hand to adjust the aperture and focus. For horizontal shots, place both of your elbows against your body for support. When you take vertical format shots, your left elbow should be placed against the body for support. Cradle telephoto lenses in your left hand.

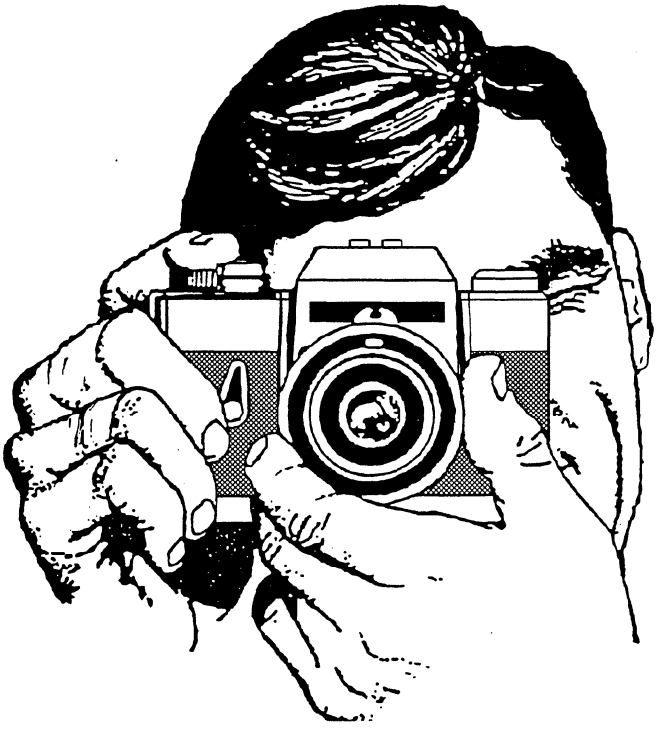


**Figure 11-6.—Holding the camera.**

## FOCUSING THE CAMERA

A camera is focused by moving the lens closer or farther from the film (focal) plane. The two basic methods of focusing are scale focusing and SLR focusing. Both types of focusing are covered in the following text.

### Scale Focusing

In scale focusing, you use a scale of distances to which the lens is set. This scale maybe inscribed on the lens barrel or on the camera frame (fig. 11-7), depending on the camera design.

Scale focusing is used primarily with small aperture lenses that have sufficient depth of field to overcome small camera-to-subject distance estimate or measurement errors. To use the focusing scale, you must estimate in most cases, the camera-to-subject distance.

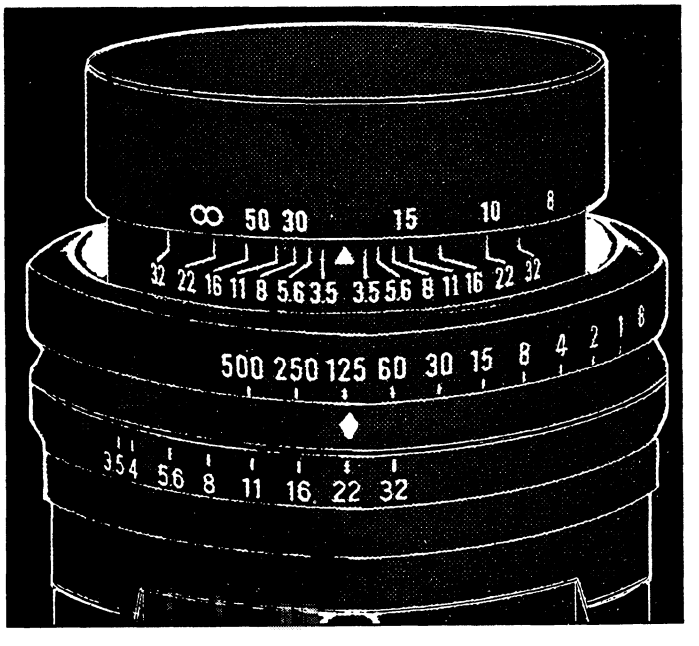



**Figure 11-7.—Focusing scale on a camera lens.**

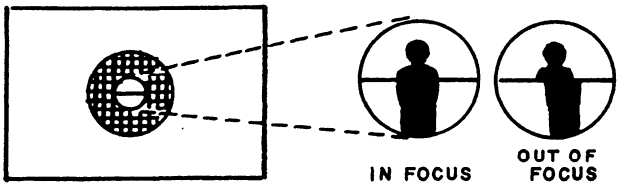



**Figure 11-8.—Split image focusing in a SLR camera.**

This estimated distance is then set to the focus index mark on the lens or other focus index on the camera. The most accurate way to use focusing scales, of course, is to measure the camera-to-subject distance with a tape measure.

### SLR Focusing

The SLR camera has a focusing and viewing system that shows you the image formed by the taking lens. It is designed so the distance between the focusing screen and lens is exactly the same as that between the lens and the film. Therefore, whatever appears in focus on the focusing screen also will be recorded in focus on the film.

Sometimes two small prisms or a split screen is included in the central area of a SLR camera viewing screen. When the image is out of focus, it appears split in this area. Some screens have a central grid of minute prisms that produce a shimmering effect when the image is out of focus (fig. 11-8).

You focus a SLR camera by rotating the focusing ring on the lens until the image seen on the viewing screen is in sharp focus.

### SETTING THE FILM SPEED

No matter how experienced you are, you should make sure the film speed indicator matches the ISO of the film you are using. The indicator is part of the shutter speed dial of most 35mm SLRs.

### ACTIVATING THE LIGHT METER

The light meter on-off switch is located on the back of the Canon F-1 (refer to the instruction manual for other camera models). Alight-sensitive photocell moves a meter needle inside the viewfinder. When the meter needle is in line with the aperture needle, the camera is set for a proper exposure. The light meter can be left on throughout your shooting assignment. An example of a light meter is shown in figure 11-9.

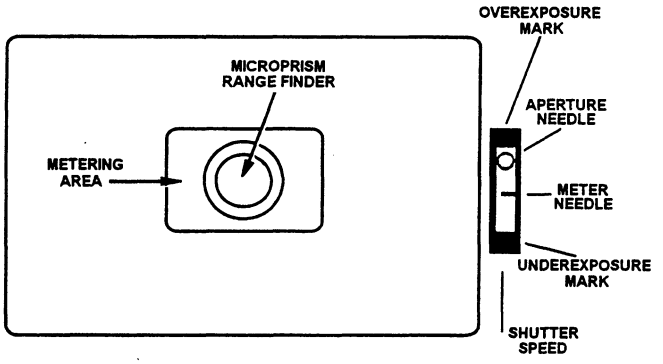



**Figure 11-9.—Light meter.**

### SETTING THE SHUTTER SPEED

The film manufacturer's instructions provide time-tested shutter speeds for varying light renditions, such as sunny, overcast and cloudy. However, on occasion, you may prefer to freeze action or blur motion. In these situations you must manipulate both the shutter speed and the aperture control ring. For instance, you may set your camera at 1/60" to illustrate the speed of a runner — his legs and arms are a blur of motion on the finished photograph.

Consequently, if you want to freeze the action, you set your camera at 1/250" or higher. Then the runner's legs, arms and victory expression are "frozen." For hand-held shots, choose a shutter speed no slower than the speed closest to the final length of the lens. For example, you would select 1/60" for a 50mm lens and 1/250" for a 250mm lens.

### SETTING THE APERTURE CONTROL

Adjust the f/stop on the aperture control ring to match the light meter requirement. The aperture control can be used to increase or decrease the depth of field, which will be explained in detail later in this chapter.

### SHOOTING THE PICTURE

Much like pulling the trigger on a rifle, you should depress the shutter release button lightly until the camera clicks. Advance the film to the next frame and you are set for the next exposure.

### UNLOADING THE FILM

One of the most common mistakes photographers make is failing to wind the 35mm film back into the cartridge **before opening the back of the camera.**

After you have exposed all frames, depress the rewind button (normally at the bottom of the camera) and slowly rewind the film. Rewinding too quickly, especially in cold weather, could crack the film or cause static electricity that will damage the film. When the film is completely rewound, you will no longer feel tension on the rewind knob.

Store the exposed film in a dry, dark container (such as a photo bag) or in its original canister until it is ready for developing. If your assignment requires you to shoot more than one roll of film, number the rolls directly on the canister using a china marker or laundry marking pen.

## INSPECTING AND MAINTAINING THE CAMERA

*LEARNING OBJECTIVE: Identify the correct method of inspecting and maintaining the 35mm single-lens reflex camera.*

*The* importance of caring for your camera cannot be overstated. The old saying, "Take care of your equipment, and it will take care of you," certainly holds true when it comes to photography. In the following text you will learn the basics of periodic camera inspection and maintenance, to include the lens, camera body and camera optics.

**NOTE:** You may be held liable for any damages while the camera is in your custody!

### THE LENS

Remove the lens from the camera according to the manufacturer's instructions. Inspect the lens and check it for dirt, smudges, fingerprints and scratches. Remove dirt with a blower brush; eliminate smudges and fingerprints by gently wiping the glass with lens-cleaning tissue moistened with a few drops of lens-cleaning solution. Be careful not to oversaturate the tissue — one or two drops should be enough.

Minor scratches may not alter the performance of the lens, but you should bring them to the attention of your LPO or LCPO. However, deep scratches will probably affect the performance of your lens. In this instance, notify your supervisor and obtain a replacement lens. If you are not sure about the severity of a scratch, reattach the lens to the camera body, look through the viewfinder and focus on a subject. If any part of the field of view appears blurred or obscured, replace the lens.

Next, check the aperture control ring. The ring should click firmly into each position. Examine the focus ring. It should move smoothly, without interruption. Check the lens exterior for dents and other damage.

Finally, make sure the lens is mounted with an ultraviolet, haze or skylight filter to protect the front glass surface and its delicate antireflective coating.

### THE CAMERA BODY

Inspect the camera body for dirt and defects. Use a blower brush to remove light dust and dirt; stubborn dirt can be removed with a silicon cloth or a soft chamois. **Do not use liquids to clean the camera body.** Liquid cleaners, including water, can damage the camera.

Check the back of the camera body and make sure it is lighttight. While the back of the camera is open, conduct a shutter speed test to determine whether the camera has maintained its calibration. You do this by opening the shutter at the varying speeds from one second to 1/1000" (or faster). There should be noticeable differences at the slower speeds (1/1", 1/2", 1/8", 1/15", 1/30" and 1/60"). Inspect the back of the outer film carriage of the camera for nicks and warps. Examine the door hinge for looseness.

### THE CAMERA OPTICS

Look through the viewfinder of the camera and focus on an object. If the field of view is blurred or obscured and you know your lens is in good condition, you may have a dirty viewfinder.

If the mirror is dirty, clean it carefully, using a blower brush. **Do not use lens-cleaning tissue or fluid on the mirror.** If smudges remain on the mirror, consult your supervisor before taking the camera body to an authorized dealer or repair shop for professional cleaning.

### OTHER IMPORTANT AREAS

Check the camera battery/internal light meter. A weak battery can affect your light meter reading, and ultimately, your photographs. Consult your instruction manual for further instructions.

Open the camera back and inspect the film chamber, rails, pressure plates, shutter curtain and take-up spool for dirt, film debris and other foreign matter. Use a blower brush to clean this area. Be careful not to press on the shutter curtain.

Inspect the neck strap for cracks and wear, especially at the pressure points (the clips that attach to the camera). In wet and humid climates, leather neck straps have a tendency to rot and should be checked daily.

Always store your camera in its case with the lens cap over the protective filter.

## CAMERA ACCESSORIES

*LEARNING OBJECTIVE: Identify the most common 35mm single-lens reflex camera accessories.*

The difficulty of choosing camera accessories is knowing what is required and what is optional. There are many accessories photographers use in their day-to-day work, but we will only mention a few to give you an idea of what they are.

Camera accessories may be considered as any photographic equipment (save a camera or lens) that is used with a camera or in picture making. Some of the more common accessories you should be familiar with include the following:

- Autowinders/motor drives
- Bulk film chamber
- Cable release
- Camera case
- Electronic flash
- Film holders
- Filters
- Lens and body caps
- Lens hoods

### AUTOWINDERS/MOTOR DRIVES

Autowinders and motor drives automatically wind-on or advance the film after each exposure. A motor drive will fire the shutter and advance the film for a preset number of exposures or work continuously. An autowinder simply advances the film after each exposure is made manually.

### BULK FILM CHAMBER

A bulk film chamber is a long-length roll film magazine designed to handle enough film for 250 or more exposures.

### CABLE RELEASE

A cable release is a device consisting of stiff wire encased in an outer flexible covering. It is used to trip a camera Shutter without touching the camera itself. One end screws into the camera shutter release; the other end has a thumb-operated plunger.

### CAMERA CASE

Several types of bags or cases are available for carrying your camera equipment Some have a foam rubber lining that can be cut into the exact shapes of your equipment to protect and hold them firmly in place. Another type of case is called a gadget bag. It is usually made of leather or plastic and has either rigid or soft sides.

### ELECTRONIC FLASH

The electronic flash is a high-voltage light source for illuminating the scene to be photographed. It produces a momentary flash of high-intensity light.

### FILM HOLDERS

Film holders are lighttight containers for photographic film. They are used for positioning the film in the camera. Variations are called sheet film holders, film pack holders and roll film holders.

### FILTERS

Filters are optical elements, such as glass, gelatin or plastic, dyed in a specific manner to absorb light of certain colors selectively, to emphasize or subdue certain objects and to improve the monochrome or natural reproduction of objects.

### LENS AND BODY CAPS

Lens and body caps are protective covers that keep dust and moisture away from lenses and camera openings.

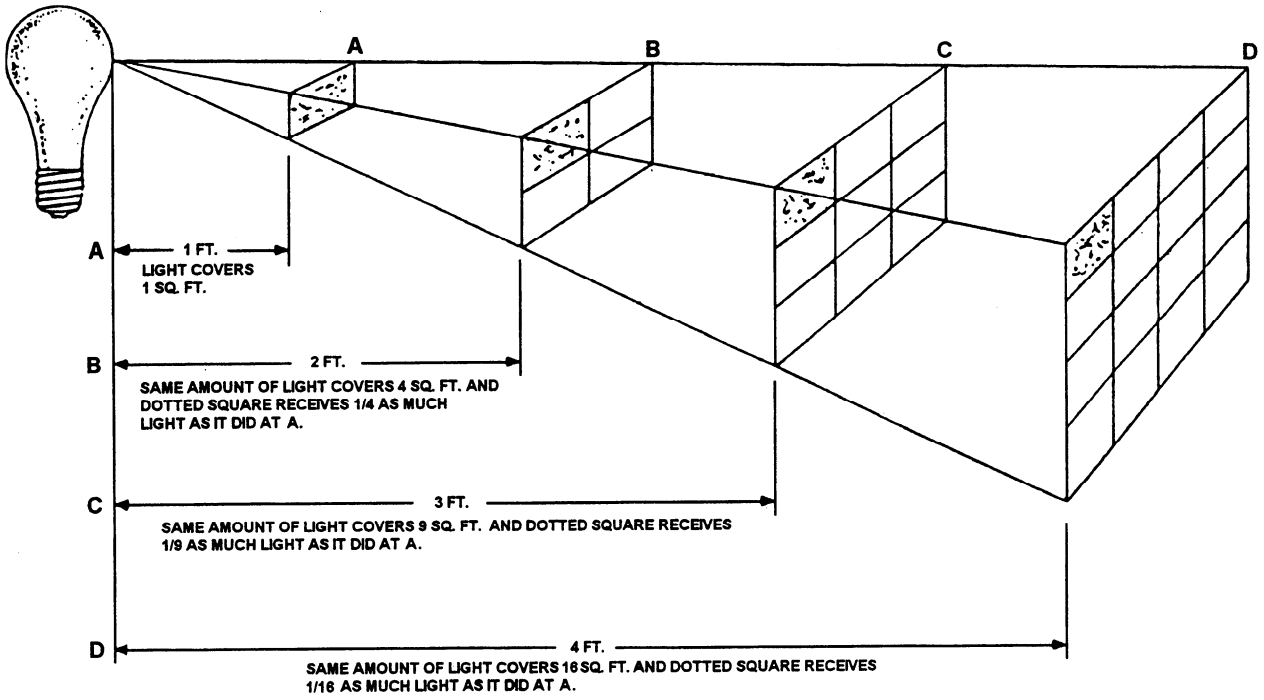



**Figure 11-10.—Inverse-square law.**

## LENS HOODS

Lens hoods, or shades, are used to keep strong sunlight from striking the front of the lens obliquely.

## PHOTOGRAPHIC LIGHTING

LEARNING *OBJECTIVE: Identify the basic theories of photographic lighting in terms of outdoor lighting, existing light and electronic flash lighting.*

Light is the most important ingredient in photography. Light makes photography possible by reflecting off the subject, entering the camera and exposing the film.

Scientists tell us that light is produced in waves. In many respects the waves of light can be compared to sound waves. Sound waves vary in length and they register as different pitches; conversely, light waves register as different colors.

The intensity of light determines the brightness of the subject. The formula that determines this is the inverse-square law (fig. 11- 10). It demonstrates that light decreases as the square of the distance increases. Becoming familiar with this law will help you use light more effectively during photographic assignments.

The light falling upon a subject from a source is tilled **incident light.** When incident light strikes a surface, it will change direction; this change is called reflection. If the surface is smooth, the reflected light is said to be specular; however, if the surface is rough, the reflected light is diffused Most objects reflect back both types of light.

Reflection is an important characteristic of light. It is how our eyes can see objects and how film acquires a latent image.

In this section you will learn how to take pictures using the following types of light:

- Outdoor
- Existing
- Electronic flash

## OUTDOOR LIGHTING

Daylight and sunlight are not constant sources — they change hourly with the weather, seasons and latitude. The changes in daylight can radically alter the apparent shapes, colors, tones and forms of a scene. The color of sunlight changes most rapidly at the extreme end of the day. Strong color changes also occur during storms, haze or mist and on blue wintery days. The

direction of the light changes as the sun moves across the sky. The shape and direction of shadows are altered, and the different directions of sunlight greatly affect the appearance of each scene.

The quality of sunlight depends on its strength and direction. Strong, direct sunlight is "hard" —it produces dark, well-defined shadows and brilliant highlights, with strong modeling of form. Sunlight is hardest on clear summer days at noon. Strong sunlight makes strong colors more brilliant, but weak colors pale. Sunlight is diffused by haze, mist and pollution in the air. This diffused or reflected light is softer; it produces weak soft shadows and dull highlights. Directionless, diffused sunlight is often called flat lighting. It produces fine detail but subdues or flattens form. In weak directionless sunlight, colors are muted — but strong, directionless, flat sunlight provides vibrant, well-saturated colors.

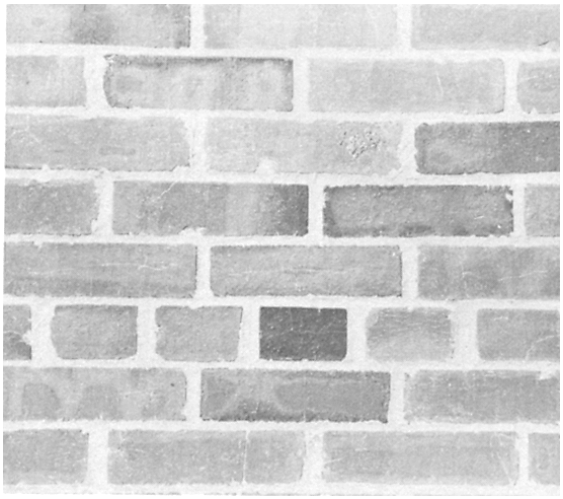


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**Figure 11-11.—Frontlighting.**

## Frontlighting

The old adage about keeping the sun at your back is a good place to continue our discussion of outdoor lighting. The type of lighting created when the sun is in back of the photographer is called frontlighting. This over-the-shoulder lighting was probably the first photographic advice you ever received. It may seem to be a universal recipe for good photography, but it is not. The case against over-the-shoulder lighting is that it produces a flattened effect, doing nothing to bring out the detail or to provide an impression of depth. The eyes see in three dimensions and will compensate for unhelpful lighting. However, a photograph is two-dimensional. To give an impression of f-, depth and texture to the subject, you should ideally have the light come from the side or at an angle (fig. 11-11)

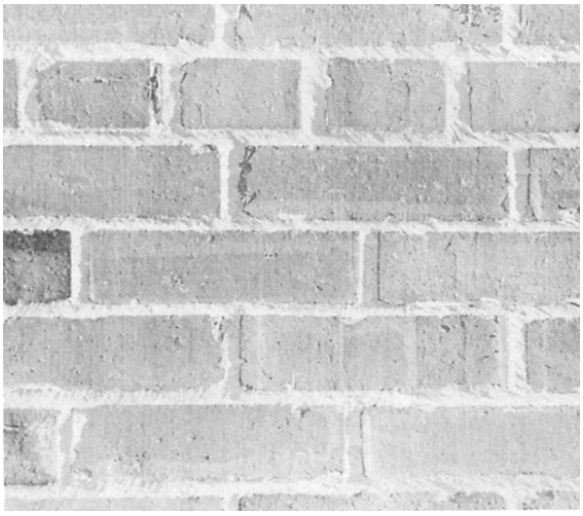

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**Figure 11-12.—Sidelighting.**

## Sidelighting

As you gain experience with various types of outdoor lighting, you will discover that interesting effects can be achieved by changing the angle of the light falling on your subject. As you turn your subject, change camera viewpoint or wait for the sun to move, the light falls more on one side, and more shadows are cast on the opposite side of the subject. For pictures where rendering texture is important, sidelighting is ideal.

Look at a brick wall, first in direct front sunlight and then in sidelighting. Direct front sunlight will show the pattern of the bricks and mortar in a flat, uninformative way, but sidelighting will create shadows in every little crevice (fig. 11-12). The effect increases as the light is more parallel with the wall until long shadows fall from the smallest irregularity in the brickwork. This can give an almost three-dimensional effect to a photograph.

Sidelighting is particularly important with black-and-white photography which relies on gray tones, rather than color, to record the subject. Shadows caused by sidelighting reveal details that can create striking pictures from ordinary objects that otherwise, hardly would be worth photographing in black and white. Anything that has a noticeable texture —like the ripples of sand on a beach, for example — gains impact

**Figure 11-13.—Backlighting without a reflector.**

**Figure 11-14.—Backlighting using a reflector.**

when lighted from the side. Landscapes, buildings and people all look better when lighted from the side.

This principle also applies to color photography. Color gives the viewer extra information about the subject that may make up for a lack of texture in frontlighting, but often the result is much better when lighted from the side.

### Backlighting

When the sun is in front of the photographer, coming directly at the camera, you have what is referred to as backlighting (fig. 11-13); that is, the **subject** is backlighted. This type of lighting can be very effective for pictures of people outdoors in bright sunlight. In bright sunlight, when subjects are frontlighted, or even sidelighted, they may be uncomfortable and squint. Backlighting helps eliminate this problem. Backlighting may require the use of a reflector or fill-in flash to brighten the dark shadows and improve subject detail (fig. 11-14). Backlighting also is used to produce a silhouette effect.

When you use backlighting, avoid allowing sun rays to fall directly on the lens (except for special effects). Use a lens hood or some other means of shading the lens to prevent lens flare.

## EXISTING LIGHT

Existing light photography, sometimes called available or natural light photography, is the making of pictures by the light that happens to be on the scene. This includes light from table, floor and ceiling lights, neon signs, windows, skylights, candles, fireplaces, automobile headlights, and any other type of light that provides the natural lighting of a scene — except daylight outdoors (moonlight is considered existing light). Existing light is that type of light found in homes, in offices, in the hangar bay, in the chapel, in the club, in sports arenas, and so on. Outdoor scenes at twilight or after dark are also existing light situations.

Photography by existing light produces pictures that look natural. Even the most skillfully lighted flash picture may look artificial when compared to a good existing light photograph. With existing light photography, the photographer has an opportunity to make dramatic, creative pictures. Existing light allows the photographer greater freedom of movement because he is not burdened with extra lighting equipment. Subject distance, when not using flash, has no effect on exposure, so you can easily photograph distant subjects that could not otherwise be photographed using flash or some other means of auxiliary lighting. With existing

light you can make pictures that you could not make with other types of lighting.

For example, flash may not be appropriate during a change of command ceremony or chapel service. Not only might the flash disturb the proceedings, but it may not carry far enough to light the subject adequately.

**Fluorescent Lighting**

Indoor scenes illuminated by fluorescent lights usually appear pleasing and natural in real life. However, color pictures of these same scenes will often have an overall color cast that makes them look very unnatural. Fluorescent light is deficient in red light and emits primarily blue and green light. Most color pictures made without a filter under fluorescent light also are deficient in red and have an overall greenish appearance. When it is used correctly, fluorescent light does have some advantages over other types of available light. A room illuminated by fluorescent lamps is usually brighter and more evenly lighted than a room illuminated by tungsten lamps. This higher level of light makes it easier to get enough exposure for your existing light photography and helps record detail that might have been lost in the shadow areas with other types of existing light.

When you are photographing people, fluorescent lighting often causes dark shadows under the eyes of the subject. This effect causes the eyes to appear dark and sunk in.

**Nighttime, Outdoor Pictures**

Outdoor night scenes usually include large areas of darkness broken by smaller areas of light from buildings, signs and streetlights. Pictures of outdoor scenes are quite easy to make because good results are obtainable over a wide range of exposures. The use of short exposures emphasizes well-lighted areas by preserving the highlight detail, while the shadow areas become dark due to underexposure. Long exposures help retain the detail of the dark areas, while highlight detail is lost as a result of overexposure.

Large, dark areas in night scenes will make it difficult for you to make accurate exposure meter readings from your camera position. You will get the best meter reading results when you take closeup readings of important scene areas.

At night you can make color outdoor pictures using either daylight or tungsten-type films. Pictures made on daylight film will have a warm, yellow-red appearance. Those made on tungsten film will have a colder more natural look. However, both films provide pleasing results so it is a matter of personal preference.

A good time for you to make outdoor night color pictures is just before it gets completely dark At this time, some rich blue (or even orange) is in the sky. This deep color at dusk gives a dramatic background to your pictures. Neon signs, streetlights and building lights make bright subjects for your pictures.

**ELECTRONIC FLASH LIGHTING**

In situations in which there is little or no light available, a portable, electronic flash unit is an invaluable piece of photographic equipment. With fast films and long exposures, you may be able to shoot existing light pictures — provided your subject remains still long enough. Although you can certainly get better lighting control with elaborate photographic lights, the simplicity and portability of electronic flash is unbeatable.

Electronic flash provides an excellent source of artificial light for exposing black-and-white and color daylight film. Light from an electronic flash unit (strobe) is characterized by its softness, short duration and color balance, approximating that of daylight.

When you measure the amount of light that actually reaches an objector scene, a numerical value is obtained that can be converted directly into a flash guide number. The numerical value is the light output rating of an electronic flash unit measured in beam candlepower-seconds (BCPS) or more correctly, effective candlepower-seconds (ECPS).

Every electronic flash unit is assigned a guide number as a measure of its light output or power. The higher the guide number, the greater the light output.

Correct exposure with electronic flash depends upon the following four factors:

- The power or light output of the flash unit
- The ISO speed of the film used
- The flash-to-subject distance
- The tistop used

Shutter speed is not a factor since the time of exposure is governed solely by the duration of the flask.

Notice we always speak of **flash-to-subject distance,** never camera-to-subject distances. With all types of artificial illumination (the same as with

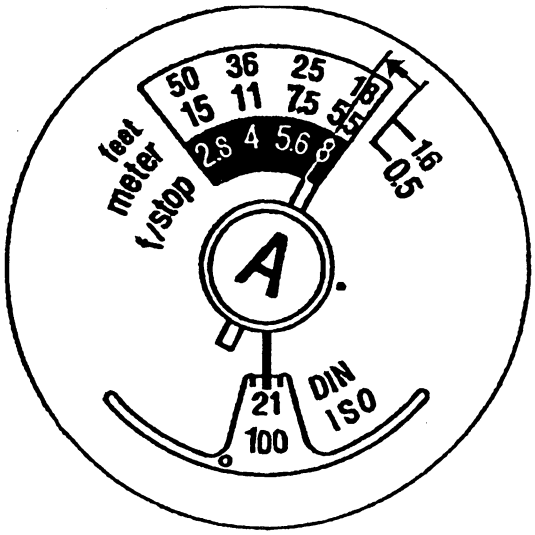


**Figure 11-15.—Exposure scale on a flash unit (automatic mode).**

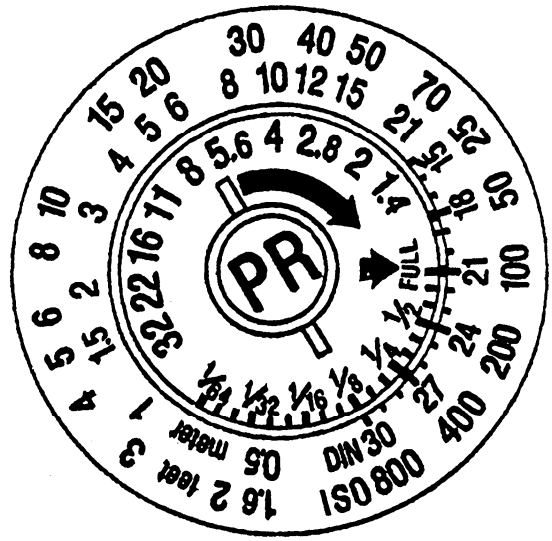


**Figure 11-16.—Exposure scale on a flash unit (manual mode).**

sunlight), the only consideration is the amount of light reflected from the subject. The distance between the camera and the subject has no bearing on exposure. When the flash is used off the camera, the basic f/stop is still calculated with the flash-to-subject distance.

### Automatic Electronic Flash Units

Most electronic flash units can be operated in an automatic exposure mode. An automatic flash unit eliminates the need to determine the correct f/stop for each flash-to-subject distance, providing the subject is within the flash distance range of the flash.

On the front of an automatic flash unit, a sensor reads the light reflected from the subject that is produced by the flash. When this sensor is satisfied as to the amount of light received, it automatically shuts off the flash. The closer the subject is to the lamp, the quicker the sensor shuts off the light.

Some automatic electronic flash units allow you to select two or more apertures to control depth of field. To determine an f/stop in the automatic mode, you can use the calculator dial located on the unit. When you match the indicator to an ISO film speed number on the dial (fig. 11-15), the f/stop to be used within a minimum and maximum distance is indicated. Once an f/stop is selected and set, it is a constant factor regardless of the flash-to-subject distance, providing it is within the flash distance range of the unit. This feature allows a photographer to move closer to or further away from the subject without having to calculate an f/stop for each change of flash-to-subject distance.

When the flash unit is in the manual mode, the f/stop must be changed every time the flash-to-subject distance changes. A scale on the flash unit (fig. 11-16) indicates the proper f/stop to use for the various distances. To determine the flash-to-subject distance for on-camera flash, focus on the subject and read the distance directly from the focusing ring on the camera.

### Single Flash

You will produce the majority of your indoor photographs with a single flash unit. Numerous reenlistments, frocking and promotion ceremonies are conducted indoors where the lighting conditions are unfavorable for available light photography. There are various methods in which a single flash can be used to produce high-quality professional photographs which distinguish you from the amateur snapshooter.

### On-Camera Flash

A flash technique commonly used is that of the flash unit attached to the camera, in synchronization with the shutter, and aimed directly at a subject. An advantage of having your flash unit attached to the camera is it gives you the chance to capture the unexpected — the truly candid shot. When spontaneity sparks the action and quick camera handling is a must, the fewer pieces of equipment you have to worry about or handle, the better. Rather than two pieces of gear (the camera and the flash), you have only one — the camera with the flash attached to it. However, this technique usually produces objectionable shadows behind the subject.

To help reduce the harshness of shadows, plain some diffusion material, such as a white handkerchief, cheesecloth, or frosted cellulose acetate, in front of the flash. Keep in mind that diffusion reduces the intensity of the light. Therefore, the exposure must be increased accordingly if you use the manual mode on the flash unit.

### Off-Camera Flash

You will make some of your best flash pictures with the flash unit off the camera. When you hold the flash off the camera and above the lens, it will tend to throw the shadows down and behind the subject. This is a good way to minimize distracting background shadows that occur when a subject is standing close to a wall. A flash held high above the lens, either left or right, makes the viewer less conscious of the flash illumination.

We are accustomed to seeing things lighted from above, and by placing the flash above the subject, it closely resembles the lighting of the sun or ceiling lights.

Light that is far enough off the camera to illuminate the subject from an angle produces modeling or roundness. This type of light creates the illusion of a third dimension — depth — and is more pleasing to the viewer than the two-dimensional flat effect you get with direct frontlighting. Angled lighting also is used to bring out the texture of a subject.

### Bounce Flash

One of the best methods to illuminate a subject or scene with a single flash unit is to use **bounce flash.** There will be times when you will want a very soft light in order to lessen the tonal range between highlights and shadows and to soften harsh background shadows. You can achieve this soft lighting by bouncing, or reflecting the flash off a light-colored surface. By doing so you are changing the narrow spot of light from a flash unit into a wide, diffused area of light.

Most bounce flash pictures are made with the light directed at the ceiling, either above the photographer or above the subject, or somewhere in between. You can produce a silhouette effect by bouncing the flash off the ceiling behind the subject. To accomplish this, aim your flash unit so most of the light bounced off the ceiling falls on the background behind the subject and calculate the exposure for the background.

For the flattest bounce light, try bouncing the light off a wall behind the camera. With this lighting you will have practically no shadows. Here you will have to calculate your exposure based on the flash-to-wall-to-subject distance.

### "RED-EYE"

An effect that may appear with direct flash is "red-eye." Red-eye occurs in pictures of people and animals when the. flash is used close to the optical axis of the lens and the subject is looking at the camera. It is caused by light reflecting from the blood vessels at the back of the eye. The darker the room is, the stronger the effect will be because the pupils of the eyes will be dilated. Red-eye can be avoided easily by your moving the flash away from the lens optical axis. Also, you can minimize the effects of red-eye by turning up the room lights.

## PHOTOGRAPHIC FILTERS

*LEARNING OBJECTIVE: Identify the purpose of photographic filters, the various filter designations, and the filters used in black-and-white and color photography.*

Filters are used in all the various steps of the photographic process. Though often neglected in the shooting stage, the use of filters can tremendously enhance the final product in both black-and-white and color photography.

### PURPOSE

The purpose of photographic filters is to alter the characteristics of light that reaches the light-sensitive emulsion. As light is transmitted through a filter, at least one of the following alterations occurs:

- The color of light is modified.
- The amount of light is reduced.
- The vibration direction of the light rays is limited.

To use photographic filters properly, you must understand the nature of transmitted light.

White light is composed of three primary colors: red, green and blue. A filter of a primary color will transmit its own color and absorb the other two; for example, a red filter looks red because it transmits red and absorbs green and blue, as shown in figure 11-17.

Secondary colors are mixtures of primary colors. Yellow, for example, is a combination of red and green. Because a filter passes its own color and absorbs others,

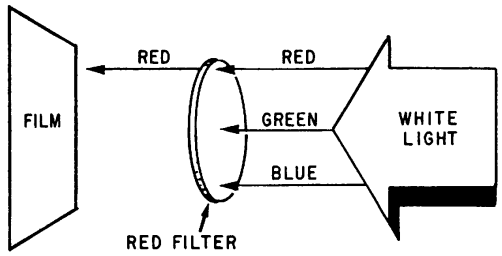


**Figure 11-18.—Characteristics of a red photographic filter.**

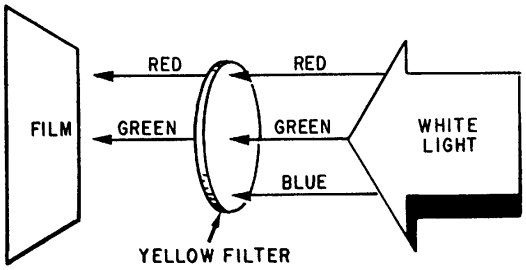


**Figure 11-19.—Characteristics of a yellow photographic filter.**

a yellow filter passes read and green and absorbs blue (fig. 11-18).

In selecting a filter in black and white photography, you can use the color star in figure 11-19 to determine the effect of the filter on the gray scale of the negative and the final print. On the final print, the result will be that a filter will lighten its own color and the colors adjacent to it and darken its complement and the colors adjacent to its complement; for example, a green filter will lighten green (its own color) and cyan and yellow (adjacent colors). It will darken magenta (its

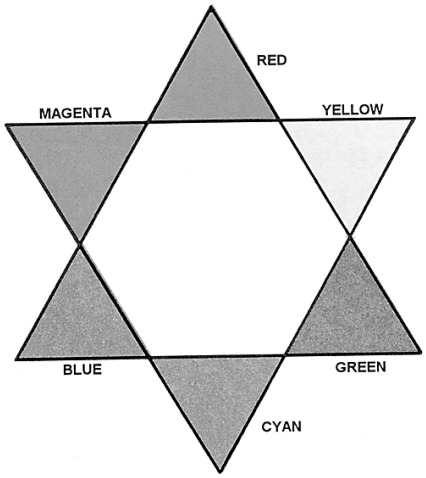


**Figure 11-19.—Color star**

complement) and blue and red (adjacent colors of the complement).

## FILTER DESIGNATIONS

Some filters are designated by a descriptive name, such as neutral density, haze, polarizing and skylight. Color compensating and color print filters have yet another designation system.

The Kodak Wratten™ filter line uses a numbering system to designate its black-and-white filters, as shown in table 11-1 that filters in the

**Table 11-1.—Kodak Wratten™ Filter**

| Filter Color and Number | | Filter Color and Number | |
|---|---|---|---|
| Deep Red | 29 | Bluish Green | 65 |
| Red | 25 | Bluish Green | 65 |
| Light Red | 23A | Cyan | 44 |
| Orange | 21 | Cyan | 44 |
| Deep Yellow | 15 | Blue | 47 |
| Yellow | 8 | Deep Blue | 47B |
| Yellow-Green | 11 | Violet | 34A |
| Yellow-Green | 13 | Violet | 34A |
| Green | 58 | Magenta | 33 |
| Green | 61 | Magenta | 33 |

first column lighten colors next to them, and opposite filters darken colors on the print. For example, a yellow-green No. 11 filter lightens subjects that are yellow-green or yellow and darkens subjects that are violet. A No. 44 cyan filter lightens blue and blue-green and darkens light red and orange.

## USING FILTERS IN BLACK-AND-WHITE PHOTOGRAPHY

Filters may be used in black and white photography for the following major reasons:

- To make the tones of gray in the final product conform more closely to the visual effects of colors in the original scene.

- To provide scenic contrast, such as darkening the sky so that clouds "stand out." You can use a No. 15 or a No. 25 filter for this purpose.

- To lighten or darken a color to make it "disappear" or stand out in sharp contrast. An example of this could be photographing an old document that is written in blue ink and has yellowed with age. Here, a deep yellow filter would darken the blue writing, and at the same time, lighten and possibly remove the yellow stain.

Whenever you use a filter, you must change the exposure. The amount of change depends on the sensitivity of the film to the colors absorbed by the filter as well as the quantity of that color in the type of light used. The effects of the filter in terms of exposure correction are given on the film data sheet as a filter factor.

The filter factor may be applied to the exposure by opening the diagram one f/stop each time the filter factor is doubled. Thus a factor of two requires that the diagram be opened one f/stop larger than is needed for correct exposure without a filter; a factor of four call for two f/stops, a factor of eight for three f/stops, and so on.

An easy formula for determining exposure correction when you are using a filter is to divide the film speed by the filter factor and use the results as a corrected film speed on your exposure meter. As an example, when you use a black-and-white film with an ISO of 400 and a No. 11 filter (filter factor four), divide four into 400 and use the results, 100, as the film speed on the exposure meter. When using this method, make sure you return the meter dial to the correct film speed after using the filter.

## FILTER FOR COLOR PHOTOGRAPHY

Problems associated with color materials are quite different from those encountered with black-and-white materials. In color photography, the main problem is achieving correct color balance. The principal factor involved is the color temperature of the light source being used to illuminate the subject. This provides a natural appearance to the final product. Filters for color photography are classified as light balancing, conversion, and color compensating.

### Light Balancing Filters

Light balancing filters come in two series (not to be confused with a series that indicated physical size): the series 81 (yellowish filters) are used to lower the color temperature of light source, and the series 82 (bluish filters) are used to raised the color temperature of light from a light source. Both series are used when a tungsten light source is used with color film.

### Conversion Filters

Conversion filters are used in color photography when a significant adjustment of an exposing light is required to convert the color quality of the exposing light the color temperature for which a film is balanced.

Conversion filters generally come in two series. The 80 series of filters are blue in color and convert tungsten light to color qualities acceptable for use with daylight film. The 85 series are amber in color and convert daylight to color qualities acceptable for use with tungsten film.

The correct filter to use for a given situation with a given film can be determined by reading filter and film data sheets. If your are in doubt, seek help from your ship or base imaging facility.

### Color Compensating Filters

Color compensating (CC) filters are used to adjust the overall color balance obtained from color film, particularly slide film. Without the use of color compensating filters, improper color cast can result.

For cameras, CC filters are normally used to color balance the light from sources, such as fluorescent, tungsten, and mercury-vapor lights, and the "bounce" light reflected from colored surfaces. They are also used to balance lighting effects under unusual circumstances (such as underwater lighting). These filters can be used

to compensate for a known color deficiency of an unexposed color film. They also can be sandwiched (layered) when mounting a color transparency to compensate for an off-color hue.

## SPECIAL-PURPOSE FILTERS

Some of the special-purpose falters you will work with include the following:

- Neutral density
- Haze
- Polarizing
- Skylight

### Neutral Density Filters

Neutral density (ND) filters reduce the amount of light passing through a camera lens without changing the reproduction of colors in the scene. These filters are nonselective in their absorption of colors of light and therefore uniformly reduce the various colors of light in the spectrum. Thus white light and colored light are transmitted through a ND filter with only the **intensity** of the light being affected. These filters can be used with both black-and-white and color film.

ND falters are gray in appearance. These falters may be needed for pictures of a brilliant subject in bright sunlight. When you have set the fastest shutter speed and the smallest f/stop and still cannot take the picture without overexposing the film, you can use a ND filter to further reduce the exposure.

### Haze Filters

Suspended in the earth's atmosphere are minute particles of vapor and dust that cause a veil-like appearance called haze. This haze is most apparent in distant scenes. Haze is the result of sunlight being scattered by minute particles of matter that are present in the air. The amount of haze can vary due to atmospheric conditions. Haze should not be confused with mist, fog, smog, smoke or clouds. These conditions also can produce a veil-like appearance but falters have no effect.

When sunlight is scattered, green and red light also are scattered by the ever-present haze, but not nearly as much as ultraviolet radiation, violet and blue light.

Penetration of the haze is possible when filters are used to absorb scattered sunlight. A haze filter is any filter that absorbs atmospherically scattered sunlight. This includes contrast and correction filters. When contrast and correction filters are used for haze penetration, they may be considered special-purpose falters. Although contrast filters can be used for cutting haze, these filters affect the gray tone rendering of colored objects. The contrast and correction filters that absorb the shorter wavelengths are the most effective. The recommended contrast and correction filter colors, in the order of greatest to least effective, for haze penetration are as follows:

- Red
- Orange
- Yellow
- Green

The use of an infrared sensitive black-and-white film with an infrared filter provides the greatest haze penetration of all.

### Polarizing Filters

Polarizing filters look like gray neutral density filters. However, their effect becomes apparent when you look at the blue sky through a polarizing filter while rotating it. As you rotate the falter, the sky appears to get darker, then lighter.

Polarizing filters are used in black-and-white and color photography for the following reasons:

- To reduce or eliminate unwanted reflections (glare) from nonmetallic surfaces, such as glass and water
- To effect exposure control (similar to ND filters)
- To reduce the effects of haze
- To darken the blue-sky image in both black-and-white and color photography
- To increase color saturation in a color photograph without altering the hues of image colors

There are a number of different polarizing filters. However, there are only two main types: one type fits over the camera lens, and the other is designed to be used over a light source. Since they do not affect color, polarizing filters and screens may be used for both black-and-white and color photography.

**Skylight Filter**

A skylight filter adds warmth to a scene recorded on color transparency film by absorbing ultraviolet radiation. It does this by reducing the bluish cast prevalent in distant scenes and in scenes photographed on heavily overcast days or in open shade. A skylight filter is light pink in color.

## EXPOSURE CALCULATION

*LEARNING OBJECTIVE: Identify the components used to calculate a photographic exposure.*

When you click the shutter, a series of events occur inside the camera. The shutter opens and closes, and light passes through the lens of the camera onto the sensitized emulsion (film), forming a latent image. The emulsion will eventually yield a record of what the camera saw at the moment of exposure. This series of events will yield a satisfactory photograph, in a technical sense, only if the exposure was correct.

You must compute exposure to make sure that the amount of light reaching the sensitive emulsion is sufficient to record the image. Exposure depends on the sensitivity of the photographic emulsion to light and on the brightness reflected by the original subject. Because you usually desire to record the whole range of tones between the brightest and darkest parts of the original scene, you will have to adjust your exposure accordingly.

The same exposure can be given to a certain subject by using various combinations of lens openings and exposure times — a wide opening and short time of exposure may allow the same total amount of light to reach the photographic emulsion as a small opening and along exposure time. At the moment, your consideration of the other factors involved in exposure, such as image movement, depth of field and the use of filters, is unimportant. After you have decided upon the connect total exposure necessary for a given subject at a given time, you can modify the lens opening and shutter speeds later as you desire for specific results.

Incorrect exposures will ruin more of your photographs than any other technical error, yet accurate exposure is relatively simple. By reading and using the exposure guides contained in the film data accompanying your film, you can expect good results most of the time. However, accurate exposures using daylight or tungsten light sources can only be obtained by the connect use of an exposure meter.

An important factor for you to remember is that no light meter, camera, film or manufacturer can guarantee the connect exposures that good photography demands. The only guarantees are your awareness and practice of the exposure theory and practical meter techniques. Good exposure techniques are efficient and simple. Your having the knowledge of exposure techniques frees you from the stumbling block of exposure determination so you can concentrate on taking pictures, and it simplifies the subsequent developing and printing process.

### THEORY

The term *exposure,* while having different meanings at different times, is most often used by photographers to indicate a certain combination of shutter speed and lens aperture. In this case, the shutter speed denotes the length of time the shutter is "open," allowing light to pass through the lens to strike the film.

As stated earlier, various combinations of lens aperture and shutter speed can yield the same exposure. The correct determination of camera exposure is the object of all exposure tables, charts, calculators and meters.

In any given photographic setting a variety of light will be reflected, since the brightness of various objects will reflect varying densities of light. Therefore, the exposure must be adjusted to produce the correct range of densities.

The result of exposure and development of film is very similar in many ways to that of rain falling on a light-colored concrete sidewalk When the rain begins, only a few drops fall. The cement is darkened at only a few spots. As the rain continues, the cement becomes darker and darker, until it is uniformly wet and dark Continued rain will then cease to cause any more changes in the color of the cement sidewalk.

You have experienced differences in the intensity of rain showers. At high intensities, much water comes down in a unit period of time, such as one minute. At low intensities, the amount of water is much smaller. As a result, you could get the same total amount of water within varying periods of time, according to the intensity of the rain. The total amount of rain recorded is equal to its intensity multiplied by the time during which it fell. The effects with light are very similar. Exposure is the amount of light falling on a unit area of the film or on a unit area of photographic paper. The intensity is the amount of light falling on this unit area during the exposure time. Thus the equation for exposure is as follows:

$$\text{Exposure} = \text{Intensity} \times \text{Time} \quad (E = I \times T)$$